Pneumonia in Childhood

Treatment by Combined Penicillin and Sulphamezathine

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AFTER the neonatal period pneumonia and bronchitis rank as the principal killing diseases until the age of 4 years. Reviewing 178 cases of pneumonia in children of all ages treated with sulphapyridine Gaisford (1940) recorded an overall mortality rate of 8.4 per cent, but in those under six months of age there were 5 deaths out of a total of 11 cases, giving a mortality rate of 45 per cent. Smellie (1949) recorded a mortality rate of 28 per cent from bronchitis and pneumonia in infants under one year of age for the period 1946-1948. More recently Holzel and Wolman (1950) recorded 28 deaths among 76 infants (36 per cent) under six months of age. Over this age there were five deaths in 118 cases (4 per cent). In the present series there were no deaths in 45 cases, 12 of which were under six months of age. These results are extremely gratifying and it is considered that the series is worth recording.

CLINICAL DATA IN CHILDREN UNDER SIX MONTHS.

Pneumonia in the first six months of life causes most concern and in all published series this period has by far the highest mortality figures.

Predisposing Causes.—An analysis of the twelve cases in this age group shows the important part played by lesions of the upper respiratory tract in the ætiology of pneumonia in infants. In five cases coryza immediately preceded the pneumonia. In one case influenza in the parents was followed by pneumonia in their infant. Pneumonia developed in one child who had just recovered from an abscess on the buttock and in another child whose resistance had been lowered by gastro-enteritis four weeks previously. Two cases were from families in which the home conditions were deplorable.

Symptoms and Signs. — In one case the onset was by loss of appetite and vomiting. A cough, dry or loose, was the initial symptom in all other cases. This was followed in two or three days by increased respiratory rate. In most cases the alæ nasi and other accessory muscles of respiration were in action. In eleven cases crepitations or râles were audible in the chest. Six out of the twelve cases showed definite cyanosis. No child was apyrexial on admission to hospital and the admission temperature varied between 101°F and 105°F. Convulsions occurred in only one case.

The duration of symptoms before treatment was three days in eight cases, two days in two cases and one day in two cases.

The time taken for the pyrexia to subside following the commencement of therapy varied from two to seven days, the average time being five days.

Excepting one premature infant, who had been bottle fed and who relapsed on the eleventh and again on the twenty-ninth day but finally recovered, the duration of stay in hospital varied from eight to fourteen days.

X-Ray Findings.—The lung fields were normal in five cases and definite areas of consolidation were seen in only four cases. "An increase in vascular pattern at the bases," "severe bronchitis," and "hilar enlargement" were each seen in one case.

Tuberculin Tests.—A complete Mantoux series was done in eight children, and in all the tests were negative.

Clinical Data in Children Over Six Months.

From six months of age to one year there was little change in the natural history of pneumonia from that described above, except that listlessness and anorexia often preceded a cough. Two out of the four cases in this age group vomited occasionally. One child had a history of convulsions in infancy, but in spite of this there were no muscular twitchings or convulsions during the course of a pneumonia in which there was a high grade pyrexia. One child exhibited the typical features of mongolism and, true to type, it had always been "chesty" and had a ventricular septal defect. The youngest age at which antral infection played a part in lower respiratory tract infection was in a child of nine months in whom X-ray sinuses showed "infection of both antra especially right." Seven days after admission this child was apyrexial, the chest was clear clinically and there were no symptoms. Twenty-four hours later the temperature rose to 103°F and coarse crepitations were audible on the right side of the chest. In a further twenty-four hours crepitations and bronchial breathing were audible at the left base. X-ray of chest at this stage showed "Consolidation at left base and well marked bronchitis on right side." The infection finally responded to streptomycin $\frac{1}{8}$G. twice daily for three weeks. This child was in hospital for thirty-five days.

Over the age of one year the symptoms and signs of pneumonia are well known and only a few points of special interest need be mentioned. Coryza was still occasionally the precursor of pneumonia. A child aged one year and eight months suffered from recurrent head colds, was anæmic (Hb. 65 per cent), and had had a recent attack of influenza. Another child had left otitis externa and bilateral blepharitis and was in a debilitated condition just before the onset of pneumonia. In several cases influenza in a parent was followed by penumonia in the child.

One unusual case conformed to the debatable entity described as rheumatic pneumonia which occurs in just over 1 per cent of cases of acute rheumatism. This type of pneumonia is characteristed by a rather silent course. There is no chill, breathing is usually not embarrassed and cough may be absent or trivial. The physical signs include dulness to percussion, bronchial breathing and crepitations. A characteristic feature of these signs is their transient and sometimes migratory nature. A child aged eight years was admitted to hospital with a history of having had pain in the left wrist five days before admission. The pain

subsequently flitted to both knees and then to both hips. There were no chest symptoms. On admission the child was pale and thin, pyrexial, sweating, flushed and dyspnœic. Heart sounds were soft, there was an apical systolic murmur and a tachycardia but no appreciable cardiac enlargement. Bronchial breathing and crepitations were distinctly audible at the base of the right lung. An X-ray of chest (25. 9. 50) showed "Prominent hilar shadows and some inflammatory changes at right base suggesting a resolving pneumonia." In one week this opacity was less marked and had completely disappeared in a further week. The blood sedimentation rate (Westergren) was 65 mm. in the first hour. An E.C.G. on 29. 9. 50 showed "lowish voltage limb leads. PR intervals all of 0.2 seconds. Some prolongation of QT interval. Would fit in with an acute rheumatic state."

Diagnosis.

The rapid respiratory rate and the working of the alæ nasi and other accessory muscles of respiration, with or without cyanosis, suffice for the diagnosis in an infant. In general the younger the infant the less important are the physical signs, though adventitious sounds were present in eleven of the twelve cases under the age of six months.

In an older child the diagnosis may not be so obvious, but a hot dry skin and dyspnœa are strongly suggestive, and a cyanotic tinge is common, but not invariable. Careful auscultation is required in the child with no obvious respiratory distress or cyanosis, and then the diagnosis depends upon the proper appraisement of minimal symptoms and signs. Pneumonia in infancy and childhood may have an insidious onset. Cough is then the commonest presenting symptom but malaise, vomiting, diarrhœa, or a convulsion may herald the infection. In any ill child the possibility of pneumonia should be kept in mind. Crepitations, râles, or a small patch of bronchial breathing are the usual confirmatory signs.

X-ray appearances showed pneumonic patches of consolidation in twenty-five out of forty-five cases. Large opacities may clear radiologically in one week.

Prognosis and Assessment of Response.

The great recuperative powers of children and prompt and modern therapy justify an optimistic immediate and remote prognosis. It is now accepted that the leucocyte count has no prognostic significance.

Using the treatment detailed below in the 0-6 months age group (12 cases) immediate response was good in four cases and fair in seven. In one case there was no improvement, but later the illness responded to streptomycin. In the 6 months-1 year group the immediate response was good in two, fair in one and one responded only later and to streptomycin. In the 1-2 years groups (9 cases) immediate response was good in five and fair in four cases. In the 2-5 years age group (10 cases) immediate response was good in eight, and fair in two. In the 5-10 years age group (10 cases) there was a good immediate response in all cases except the case of rheumatic pneumonia.

Treatment.

Prophylaxis.—Detailed histories taken in this series confirmed that overcrowding and an inadequate diet predisposed to respiratory infection. Adults with coryza or influenza should avoid close contact with children. Where contact is unavoidable some form of mask should be worn. An adequately balanced diet in which emphasis is placed on the protective foods is the most important ancillary aid to the prevention of these infections. The protective foods are dairy-foods (milk, cheese, cream, butter, eggs and meat) and garden-produce (green-leaf vegetables, carrots, tomatoes and oranges). The catarrhal child with a second-rate respiratory mucosa should be given double the ordinary dose of cod-liver oil. Mackay et al (1946) found that anæmia was associated with an increased morbidity rate and concluded that the anæmia was nutritional and correctable by iron therapy. Green vegetables and some proprietary breakfast foods (corn flakes, whole bran, shredded wheat) are good sources of iron and during childhood some of these foods should be given daily.

Curative. — Combined penicillin and sulphamezathine therapy in the dosage shown below was used. Streptomycin was used in cases failing to respond to these drugs.

Treatment Scheme.

Age	0-6 months	6 mths.-1 year	1-2 years	2-5 years	5-12 years
Penicillin	1 c.c. Distaquaine twice daily for five days for all age groups.				
Sulphamezathine	Initial dose 0.5 G. and 0.25 G. four hourly for 5 days	Initial dose 0.5 G. Repeat in 6 hours and 0.25 G. four hourly for 5 days	Initial dose 0.75 G. and 0.5 G. four hourly for 5 days	Initial dose 1 G. and 0.5 G. four hourly for 5 days	Initial dose 2 G. and 1 G. four hourly for 5 days
Streptomycin	$\frac{1}{8}$ G. 12 hourly for 5 days	$\frac{1}{8}$ G. 12 hourly for 5 days	$\frac{1}{8}$ G. 12 hourly for 5 days	$\frac{1}{4}$ G. 12 hourly for 5 days	1 G. daily for 5 days

Oxygen therapy by means of an oxygen tent should be given to all cyanosed infants.

"Estopen," a new chemical derivative of penicillin, is reputed to have an exceptional affinity for the lungs. The aqueous suspension is administered by intramuscular injection. So far as the writer's experience goes it is not more effective than the scheme outlined above.

In cases failing to respond to penicillin and sulphamezathine aureomycin would now be used, though, because of the tendency of this drug to induce nausea and vomiting, it will probably give way to terramycin when the latter becomes more readily available. Using oral terramycin Swift (personal com-

munication) successfully treated fifteen children with lobar or broncho-pneumonia. "Subsidence of acute signs was rapid and fever disappeared in one to two days. An infant of nine months having failed to improve with penicillin and aureomycin, responded immediately to terramycin (50 mg./lb.)." Swift recommends an initial loading dose of 50 mg./lb. and a maintenance dose of 25mg./lb. of body weight six hourly for a period of four to eight days.

Summary.

A survey of all cases of pneumonia admitted to a ward at the Royal Belfast Hospital for Sick Children between 1st October, 1950, and 31st April, 1951, suggests that combined sulphamezathine and penicillin therapy can effect an improvement in the morbidity and mortality figures of pneumonia in infancy and childhood. Forty-five cases were successfully treated. There were no complications. A recurrence of pyrexia does not indicate a relapse provided that the child's general condition is improving. Recurrence of pyrexia with a deterioration in the child's condition should lead to a suspicion of lung abscess, empyema or otitis media.

These cases were under the care of Dr. T. Howard Crozier, to whom I am greatly indebted for permission to publish and helpful criticism. Thanks are due to Dr. Douglas Boyd for the reports on X-rays and to the Editor for advice on the preparation of this paper.

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REVIEW

PHARMACOLOGIC PRINCIPLES OF MEDICAL PRACTICE. By J. C. Kranz Jr., and C. J. Carr. Second edition. (Pp. xvii + 1116. 76s. 6d.). London: Baillière, Tindall & Cox. 1951.

The first edition of Kranz and Carr was reviewed favourably in this Journal (*Ulster med. J.* **18**, 232). In the second edition, now published, the book has undergone considerable enlargement and some re-arrangement, necessitated by the introduction of many new drugs. It is now one of the best and most up-to-date books of its kind and can be recommended both to senior students and to clinicians. Some of the criticisms of the first edition are still valid, and a surprising confusion of ergotoxine with ergotamine still appears in the tracing on p. 674. But no serious errors have been detected. The book deals extensively with the therapeutic application as well as the pharmacology of drugs. Its use for reference by medical practitioners would undoubtedly lead to an improvement in scientific treatment. E. B. C. M.